機率假定密度濾波器與卡門濾波器應用於無線感測網路中之效能比較研究

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摘 要

本論文利用機率假定密度(Probability Hypothesis Density，PHD)濾波器，卡門濾波器(Kalman Filter)於無線感測網路(Wireless Sensor Networks，WSNs)佈置之環境中，進行變動物件之追蹤效能的比較。並以電腦模擬進行其追蹤之均方根誤差(Root Mean Square Error，RMSE)的探討。雖然PHD之演算法有較小誤差之追蹤效能，然而卡門濾波器之結果在硬體的實現上可以得到較優的益處。本研究結果可以作為WSN之變動性物件追蹤之設計時的參考。

關鍵詞 : 無線感測網路、機率假定濾波器、卡門濾波器、均方根誤差。

目錄

參考文獻

[1]Punithakumar, K. ; Kirubarajan, T. ; Sinha, A. Multiple-model probability hypothesis density filter for tracking maneuvering target, IEEE Transactions on Aerospace and Electronic Systems 10.1109/TAES.2008.4516991.
[2] K. Panta, B. Vo, S. Singh and A. Doucet, "Probability Hypothesis Density Filter versus Multiple Hypothesis Tracking," Proc. of SPIE,Signal Processing, Sensor Fusion & Target Recognition XIII, Vol. 5429,Iven Kader, Editor, August 2004, pp. 284-295.
[3] L. Lin, Y. Bar-Shalom and T. Kirubarajan, "Data Association Combined with the Probability Hypothesis Density Filter for Multitarget Tracking," Proc. of SPIE conference on Signal and Data Processing on Small Targets, Orlando, Florida, April 2004.
[4] B. Vo, S. Singh and A. Doucet, "Sequential Monte Carlo Implementation of the PHD Filter for Multi-Target Tracking," in Proc. of Fusion'2003,pp. 792-799, Cairns, Australia.
[5] H. Sidenbladh, "Multi-Target Particle Filtering for the Probability Hypothesis Density," Proc. of Fusion'2003, pp. 1110-1117, Cairns,Australia.
[6]Greg Welch and Gary Bishop. Kalman Filter Introduction TR 95-041 Department of Computer Science University of North Carolina at Chapel Hill Chapel Hill, NC 27599-3175.
[7] M. Orton and A. Marrs, “ Particle filters for tracking with out-of-sequence measurements, ” IEEE Trans. Aerosp. Electron. Syst., submitted for publication.
[8] T. Clapp and S. Godsill, “ Improvement strategies for Monte Carlo particle filters, ” in Sequential Monte Carlo Methods in Practice, A. Doucet, J. F. G. de Freitas, and N. J. Gordon, Eds. New York: Springer-Verlag,2001.
[9]D. Clark, A. T. Cemgil, P. Peeling, and S. Godsill. Multi-object tracking of sinusoidal components in audio with the gaussian mixture probability hypothesis density filter. Proc. of IEEE Workshop on Applications of Signal Processing to Audio and Acoustics, October 2007.
[10] S. P. Won, W. W. Melek, and F. Golnaraghi, “ Position and orientation estimation with an IMU and a position sensor using a Kalman filter and a particle filter, ” in Proc. IEEE IECON, Orlando, FL, Nov. 9 – 13, 2008, pp. 3006 – 3010.
[11] Shu, F.; Sakurai, T.; Zukerman, M.; Vu, H.L.; , "Packet loss analysis of the IEEE 802.15.4 MAC without acknowledgements," Communications Letters, IEEE , vol.11, no.1, pp.79-81, Jan. 2007 [12] J. Zheng and M. J Lee, “ Will IEEE 802.15.4 Make Ubiquitous Networking A Reality?: A Discussion on A Potential Low Power, Low Bit Rate Standard, ” IEEE Commun. Mag., vol. 42, 2004, pp. 140 – 46.
[13] Feng Chen; Xiaolong Yin; German, R.; Dressler, F.; , "Performance impact of and protocol interdependencies of IEEE 802.15.4 security mechanisms," Mobile Adhoc and Sensor Systems, 2009. MASS '09. IEEE 6th International Conference on , vol., no., pp.1036-1041, 12-15 Oct. 2009 [14] J. P. Walters et al., “ Wireless Sensor Network Security: A Survey, ” Security in Distributed, Grid, and Pervasive Computing, Ed., Y. Xiao, CRC Press, 2006.
[15] C. Hsin and M. Liu, “ A Distributed Monitoring Mechanism for Wireless Sensor Networks, ” Proc. 3rd ACM Wksp. Wireless Sec., Atlanta, GA, Sept. 2002.
[16] W. Ye, J. Heidemann, and D. Estrin, “ An Energy-Efficient MAC Protocol for Wireless Sensor Networks, ” IEEE INFOCOM, 2001, pp. 1567 – 76.
[17]Ismail, M.; Sanavullah, M.Y.; , "Security topology in wireless sensor networks with routing optimisation," Wireless Communication and Sensor